

ROBERT BAKER: THE FIRST DOCTOR IN THE FACTORY DEPARTMENT PART II.* 1858 ONWARDS

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Work in the Factory Department

From June 1858 until his retirement 20 years later, at the age of 75, Robert Baker was one of the two Factory Inspectors. His area covered the north-west of England, the midlands, and the west country together with the whole of Wales and Northern Ireland⁷⁷ and at the time of his retirement contained 23,346 factories and workshops.⁷⁸ In this position he supervised the enforcement of factory legislation and recommended changes in the legislation. These recommendations appeared in the six-monthly reports of the Inspectors of Factories† (which ranged more widely than do those of the present day) and sometimes as evidence to Parliamentary Commissions. Before assessing Baker's contribution, it may be helpful to outline the position which factory legislation had reached in 1858 and then trace the developments over the ensuing 20 years.

The Background

With the passing of the Ten Hour Act in 1847 the popular clamour of earlier years had died down⁷⁹ and there started a period in which factory law was extended at first within, and then beyond the textile trades.

From 1858 to 1871 the Medical Department of the Privy Council under Sir John Simon carried out careful and painstaking investigations into the public health. These included industrial diseases and the harms resulting from the ways in which various trades were conducted.⁸⁰ At the same time the

reports of the Children's Employment Commission were published.⁸¹ An early result of these investigations was the 1864 Factory Act Extension Act which brought six 'dangerous trades' under some degree of supervision and so was the first Act to extend factory legislation beyond the textile trade. It also included the first effective requirement for the provision of ventilation.⁸²

The further reports of the Children's Employment Commission led to two further developments in 1867. First was the extension of factory legislation to more industries⁸³ and 'any premises in which fifty or more persons were employed in any manufacturing process'. Second was the Workshop Regulation Act, applying to any establishment in which fewer than 50 persons were employed, which was to be enforced by local authorities.⁸⁴ Unfortunately at this time local administration was not sufficiently organized to cope with the task, and four years later control was transferred to the factory inspectorate. Both these Acts gave power to inspectors to direct the employer to provide a fan or other mechanical means to carry off injurious dust.⁸⁵

Further Acts were passed, and by 1876 there were 15 statutes regulating employment in factories, many of them with differing requirements and leading to serious anomalies.⁸⁶ To disentangle all this, a commission was appointed in 1876 'to enquire into the Working of the Factory and Workshops Acts with a view to their consolidation and amendment'. The outcome of this was the Factories Act of 1878, the first to appear in the form which we recognize today—and in that year Robert Baker reached the age of 75 and resigned.

But factories and workshops formed only part of the field in which preventive medicine was developing, and the present-day administrative boundaries between health services inside and outside factories

*For Part I of this paper see *Brit. J. industr. Med.* (1964), **21**, 85.

†On Baker's retirement in 1878 the post of Chief Inspector of Factories was created, and his colleague, Alexander Redgrave, was appointed. From that time onwards the Chief Inspector has made Annual Reports.



FIG. 3.—Robert Baker.

were not so clearly defined. Thus, for example, the implications of public health legislation on health and working conditions in factories were considered by the Royal Sanitary Commission of 1871.⁸⁷

In all these far-reaching events Robert Baker was to play a leading part (Fig. 3).

Disease and Hygiene

Although in 1858 we look forward through the 20 years during which Baker was an inspector of factories, it is important to realize that that year marked for him the completion of a quarter of a century's experience in the factory department. His report of October 1859 contrasted the changes which had taken place:⁸⁸

'The master had no time for anything but money; the Servant had no time for anything but labour; Commerce had no time for anything but production. The physical competition between the iron frame and the human frame was a question more of political than social economy. This is, in a few words, what the factory system was, previously to 1833. How happily, then, we may turn to the contemplation of 1859.'

In the same report,⁸⁹ he considered the effects of these developments on the health of the operatives: 'I put the following question also to nine certifying surgeons, "Whether any other disease specific of factory labour could be discovered among the workers?" I quote an extract from the answer of Mr. Tinker, the certifying surgeon for Hyde in

Cheshire. "In reply to your inquiries, I beg to say, that the causes of deformity which used to be so common as the result of factory labour are now never met with in this locality; even bronchitis which formerly was so frequent and injurious to the health of the workers in the card rooms of cotton mills, is of rare occurrence. Severe cases of strumous ophthalmia used to be very general, but are now much less numerous and of a milder form. I know of no disease which can be said to be specific of factory labour in cotton mills." ' The events of the next 20 years were to show what little justification there was for such unqualified enthusiasm. In fact, the next year another certifying surgeon gave evidence⁹⁰ on the injurious effects of cotton fibre and dust, and this was confirmed in 1863 by Dr. Leach of Heywood.⁹¹

In 1860 Dr. Greenhow, in a Report to the Privy Council on districts with excessive mortality from lung disease,⁹² showed that the average death rate per thousand in Bradford (a worsted district) was 5.44 for males and 5.55 for females.* For the silk town of Macclesfield the rates were 7.43 and 8.13 respectively, and for Leek, another silk town, 7.80 and 8.13. Robert Baker quoted extensively from Greenhow's Report and pointed out that in 1850 the hours of work for children over 11 years of age in silk manufacture had been raised from 10 to 10½ hours a day on the ground that labour in silk mills was lighter than in mills for other fabrics.⁹³ He concluded that 'the allegation put forth in 1850 about the manufacture of silk being a healthier occupation . . . not only entirely fails of proof, but the proof is quite the other way'. And he continued by pointing out that among females the death rate is 'higher even than it is in the cotton districts of Lancashire, where although the children work only half time, yet from the causes which render cotton manufacture unhealthy, a high rate of pulmonary mortality might be supposed to be inevitable'. Robert Baker did not comment on the inconsistency of this with his optimism of a year or two earlier.

The Factories Act Extension Act of 1864 brought pottery manufacture under the factory inspectorate for the first time. To understand the problems and to enforce the Act, Baker went to live in the Potteries from August to December of that year.⁹⁴ Extracts from his diary record the conditions he found. 'The most wretched hole imaginable. . . . Most of the outside steps were without handrails, and were thus exceedingly dangerous when used at night. The workrooms were very hot and comfortless, and had not been whitewashed for years. On asking to see

*Baker in his Factory Inspector's report wrongly quotes these as 4.29 for males and 4.18 for females.

the privies here I found only one horrible place for all the workers, without any doors, in front of a place of work constantly in use, with the people passing up and down in sight of it in every direction; no accommodation whatever for females. The total number of persons employed being 150.' By contrast, he writes, 'The courtyards are well paved, and every room and all the staircases are whitewashed once a year. Great pains have been taken to render the ventilation perfect . . . which render the rooms of an agreeable temperature, and the workers look healthy. . . . The total number of persons employed is very large.'

He then traced through 'The Potter's Employment, its effect upon Health, with suggested remedies'. These will be considered in detail in later sections.

Another dangerous trade brought under regulation by the Act of 1864 was percussion cap making. There is an account in his report of December 1865 of an enquiry into a death from an explosion and of his attention being directed to the condition of the skin of one of the operatives.⁹⁵ 'And it was stated to me that other persons had suffered from the same condition, and that it was a disease peculiar to percussion cap making. I requested Mr. Jordon, the certifying surgeon, to see the worker with me and to give me his opinion about it. The conclusion at which we both arrived was, that it was a case of eczema arising more probably from alimentary causes, than from the employment. But as the woman asserted that she had had no symptoms of any such disease till she had wiped her face with her apron when charged with the explosive powder, which I believe is a compound of potash, antimony, and a preparation of mercury, we shall watch for any other case with some interest.'

Despite this promising conclusion the matter was never referred to again. At that time, the certifying surgeon's legal duties were limited to examining children and young persons entering factory employment, together with certain investigations following accidents. This investigation of an industrial disease, in the factory, by two statutorily appointed medical officers was unfortunately an isolated incident. The opportunity, like the case, was not followed up.

On another occasion he related the case of a girl of 16 working in a cotton mill and having to bend forward excessively at her work of 'piecing up'.⁹⁶ 'I found that there was an extensive curvature of the spine forming, and that the shoulder blade was pushed at least an inch upwards from the ribs. On measuring the alley in which she worked, *i.e.*, the space between the two sets of spinning frames, the distance from spindle to spindle was only 21 inches, and as she had to curve her form to stoop to the

spindles, it was morally impossible that she could work without this contortion of the figure arising. I requested that she might be substituted for a child less in height than herself, which was complied with.' He was very much aware of the advantages that could follow if such practices as that were made general, and he repeatedly recommended them.

But to Robert Baker the physical evils of work were not confined to the trade diseases. With his memory reaching back to the early days, more than 30 years before, he reported, in April 1866, on 'Diseases, the Sequences of Factory Labour', which ensue when many women, young persons, and children are exposed to crowded ill-ventilated rooms and to ill-placed machinery. He pointed out that,⁹⁷ 'At present there are no means (or what there are are exceedingly limited) by which the overstrains, or the effect of these adventitious circumstances on their physique can be watched and regulated.'

Such effects would be caused not only by the factory labour, but by the whole environment, and he postulated 100 children submitted to factory labour of whom two-thirds were well kept and the other third lived on coffee and herrings or thin tea and bread three times a day and never tasted flesh: 'In a very short time the destructive effect of labour and confinement upon the one-third will be manifest. The under eyelid will become the colour of a china rose, the skin, so far as it can be observed for dirt, will be more transparent and the whole frame indicate weakness.'

This realization of the interdependence of industrial and social factors in the environment runs throughout Baker's writings and, as will be seen, led to his belief in the uniformity of medical supervision.

Dust

The bringing of the pottery industry under the factory inspectorate in 1864 led Robert Baker to consider what might be done to prevent the harmful effects of the dusts (Fig. 4). From the beginning, he drew attention to the provision in the Factories Act of 1864 which for the first time required factories, to which it applied, to 'be kept in a cleanly state and be ventilated in such a manner as to render harmless so far as is practicable any gases, dust or other impurities generated in the process of manufacture that may be injurious to health'.⁸² Although following current thought in attributing a large measure of blame for the serious chest disease to the 'variations in temperature during working hours to which the workers were exposed, coupled with those habits of dissipation which are so certainly initiative of pulmonary disease',⁹⁸ he went on to add, 'The death rate of the scourers, too, was and is, I regret to say,

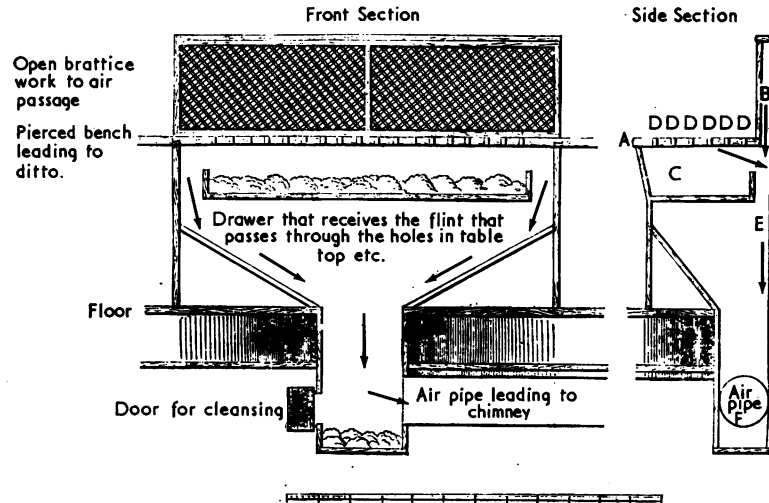


FIG. 4.—Plan of ventilator for china scouring shop. From Factory Inspector's Report (Baker) 1865.

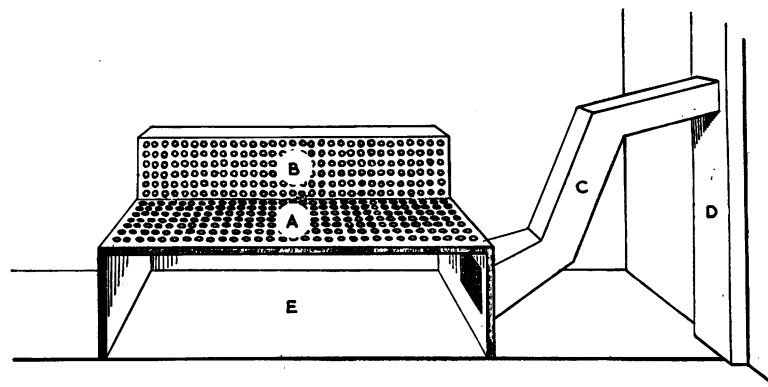


FIG. 5.—Exhaust system for the work benches of scourers in the pottery industry. From Factory Inspector's Report (Baker) December 31, 1867.

one of a very painful character. Perhaps we have not yet arrived at the most appropriate method of relieving the air near the scourer's bench of the particles of flint which are so prejudicial to mucous membranes.' Indeed, a century later, recent events would cause us to echo these words.⁹⁹

Two years later he returned to the problem of exhausting the flint powder from the work benches of scourers¹⁰⁰ (Fig. 5): 'The chest at E communicates with a flue at D, which is heated by a fire in a room below, and when the fire is sufficiently large, the draught occasioned by it is quite strong enough to withdraw the floating flint, either through the perforations on top of the bench or by a second chest at the back of the bench and in front of the worker.'

He added that he considered that the down-draught exhaust would work better with a fan, but that in potteries there was usually no steam power available, although a child could be employed to do it. Unfortunately, these ideas on exhaust ventilation did not work out.¹⁰¹ '... attributable in the former case to the fire not being always lit, especially in the summer; and in the latter, to the boy's perpetually stopping his fan to talk to the girls.'

Greenhow, in his report to the Privy Council, had suggested the use of respirators as another means of preventing dust disease,¹⁰² and Baker some 10 years later commented, with no lack of modesty,¹⁰³ 'Though I had not seen the passage (in Greenhow's Report) before, or not to remember it at all events,

I am happy to think Dr. Greenhow's suggestions and my efforts with Mr. Gratton's contrivance (the respirator) have been coincident, and I think Dr. Greenhow will not refuse me the gratification of thus, in a minor degree, uniting myself with him in his sanitary labours,' and, further on, 'With respect of china scouring, I took the liberty of sending one of Mr. Gratton's respirators (Gratton & Co. of Dublin) to Mr. Shirley of Longport requesting that he would be good enough to give it a fair trial.' Mr. Shirley subsequently reported that 'great benefit derived from its use'.

But two years later there was a depressing reference to the difficulty of persuading the workers to adopt respirators:¹⁰⁴ 'We meet, too often, with the greatest obstinacy in satisfying the employed that we are in earnest when we exhibit any endeavours for their comfort; for those who live in the dust arising from the scouring of china, in the process of hollow ware turning, or in the most fatal of all dusts, steel grinding, I have endeavoured to introduce respirators, at the expense of one shilling a piece, that would materially have mitigated the evils of their inhalation, if not have prevented them, but without much success. Year after year has gone by, and the fatality of these dusts continues . . .'

And his final summing up, just before retirement, has a defeatist air about it. Giving evidence before the Factory and Workshop Commission of 1876, 12 years after the potteries were brought under legislative control, Baker gave his opinion that,¹⁰⁵ 'Scouring of china is almost certain death in 3 years—we have tried all sorts of ways to get rid of the injurious effects to the breath from the flint which is given off in the scouring of china.

'It is only a few females that are ever put to it, and when they go they know very well that they are almost certain to die. As I say, the manufacturers have adopted certain things to carry off the flint powder upon my recommendation, in order to prevent the risk of life.'

Some idea of the fate of the suggestion for respirators was given by a close friend of Baker's, Dr. Arlidge. Many years later, he commented¹⁰⁶ that the suggestion 'gets little or no favour, chiefly because to do so exposes them (the workers) to the ridicule of their fellows, and at times proves embarrassing to the breathing'. Moreover there was also the objection that 'the moisture of the breath seizes on the minute particles of clay, and forms a sticky mixture, which after a short time chokes up the apertures in the gauze and renders respiration difficult'.

In a like way, Baker got a certifying surgeon in Belfast, Dr. C. D. Purdon, to introduce the respirator to hecklers in the flax mills, and records that

they used it 'with marked advantage'.¹⁰³ But many years later Dr. Purdon's son reported that,¹⁰⁷ 'Many of the men would not wear it, as it prevented them from expectorating when chewing tobacco.'

Lead Poisoning

Besides dust diseases, lead poisoning was one of the big industrial hazards of the day. Reviewing the Factory Acts Extension Act of 1864, Robert Baker pointed out that the meal-time regulations applied only to women and young persons. He criticized the provisions of the Act regarding washing facilities:¹⁰⁸ 'The dipper . . . washes his hands probably, when he ceases work or goes to his meals, but he dries them on his apron, which is already thoroughly impregnated with lead from splashes occasioned by his manipulation. He will tell you that he uses a nail brush to his skin and nails as soon as he arrives at home. But I should prefer that he should use one also at the works before he goes home; . . . I have, therefore, requested that slop sinks, soap, clean water, nail brushes and towels shall be provided by the employers in the works, and that the dippers and their assistants shall be instructed how to use them properly.'

Another very interesting criticism he made of the new Act was that, 'it falls short of the really prophylactic measures necessary to prevent the effects of lead poison among those who form the largest number of workers among this mineral, I mean the adult men.'

Although factory laws up till that time had not interfered with the labour of adult men, he made what at that time was a novel suggestion, that they should have been included in the meal-time regulations. Furthermore, he advocated disciplinary regulations for dress. This suggestion was based on the supposed skin absorption of lead, and in support of this concept he quoted verbatim from Watson's textbook.¹⁰⁹ Sixteen months after the Act was passed he was able to report that the dippers generally had been supplied with means for personal cleanliness.¹¹⁰

But some 10 years later his comments made poor showing against his non-medical colleague Alexander Redgrave, who described a white lead works in detail.¹¹¹ Redgrave related that caps and overgowns were not merely provided for exposed persons, but that their wearing was insisted upon. Similarly, the use of washing facilities was enforced and that baths were being constructed and their use was to be 'insisted upon when deemed requisite, or suggested by the medical attendant. As a further precaution the company consider it would be advisable to enforce, compulsorily, the use of respirators as well as gloves, when working among the pulp white lead . . .

it would be greatly for the advantage of the work-people in counteracting the action of lead colic, if the use of a small quantity of sulphate of magnesium was mixed with their beer, whilst engaged in the worst parts of the process, which would form a sulphate of any kind of lead taken into the system and so prove innocuous'.

By contrast, Robert Baker, giving evidence before the Factories and Workshops Commission at about this time, stated that if a lead line were observed in potters it would be alleviated by a simple remedy:¹¹² 'For instance a large quantity of fat bacon in the morning to breakfast, and during the day, the use of lemonade made with sulphuric acid.' This again was a reference to Watson's textbook of 1843. An up-to-date medical textbook of 1876 still recommended lemonade made with sulphuric acid but as adjuvant to other measures, including personal cleanliness.¹¹³

So, although Robert Baker had at first seen the problems clearly, as the years went by he became less clear and put forward a confused method of medical supervision. One gets the impression that he was putting hygiene preventive measures second to dietary treatment of the worker. By this time of his life his medical knowledge appears almost as an embarrassment rather than an asset. Was it because he relied on his own medical training some 60 years previously and continued to regard the employment of young children as the main medical problem of factories?

Certifying Surgeons

The certifying surgeons at first had the sole duty of issuing certificates stating that a child was of the ordinary strength and appearance of a child of a stated age. The Act of 1844 added a further duty, requiring that every factory accident, which prevented the injured worker from returning to work at 9 a.m. on the following day, should be reported to the certifying surgeon. He was to report it to the sub-inspector and to proceed without delay to the place of the accident to make a full investigation.¹¹⁴ The factory inspectors objected to this requirement. Leonard Horner had objected in 1850¹¹⁵ and 1859,¹¹⁶ and in 1868 Redgrave and Baker again raised the matter, the latter suggesting that only accidents which prevented the injured person from returning to work for a week should be reported,¹¹⁷ whereas Redgrave put the period at 48 hours.¹¹⁸ The Factory Act of 1871 adopted the latter suggestion, defining a large group of reportable accidents.¹¹⁹ In his report of October 1872, Baker welcomed this change, regretting that,¹²⁰ 'It is an omission, that explosions of gunpowder, gun-cotton, fulminating powder or

nitro-glycerine are excluded from this category.'

But the real argument over the duties of certifying surgeons raged around certifying strength and appearance. The opponents were, naturally, the employers, for they had to pay the surgeons' fees which some regarded as a 'tax'.¹²¹ Some employers criticized the way in which the surgeons examined the children, claiming that they did not auscultate the chest or test the children for muscular power, 'nor in the way of an examination give for their annual contracts a *quid pro quo*'. Baker replied to this charge in his report of October 1868:¹²² 'If the manufacturers anticipated an examination of each child or young person similar to that made by a medical inspector of recruits, they must have been greatly disappointed. Any such examination would have been obviously highly improper. To an experienced eye, the presence of incipient disease, of curvatures of the bones, of scrofula or ophthalmia, or of any important abnormal condition would be instantly detected. Under the knowledge too, by the parents, that no child can get admission to work who is in a state of disease, in consequence of this examination by the surgeon, cases requiring a critical examination are comparatively few; I say, comparatively, for still many such are rejected annually.'

But the campaign against the certifying surgeons was really based upon the fact that the introduction of registration of births in 1837 had rendered determination of age by medical examination unnecessary. Baker, throughout his period of office, strongly defended the need for such examinations, employing essentially three arguments. The first, and perhaps the weakest, was historical precedent, with a reference to Leonard Horner:¹²³ 'And it is very satisfactory for me to be able to quote Mr. Horner's authority for this practice. Having been once in the profession, my recent proceedings in this respect have here and there been looked upon as warped or prejudiced by my early pursuits, and by a sympathy with the brotherhood. Whether these foibles exist or not I am not bound to confess. We must look to a date long antecedent to my present office and to a gentleman who could by profession at all events have neither such sympathies nor weaknesses.'

Surely one of his best defences against partiality for the 'brotherhood', although he does not appear to have used the argument, was his recommendation for a reduction in their duties respecting accidents, already noted; at a fee varying between 3s. and 10s. per accident, this might provide £165 a year for a single surgeon.¹²⁴

The second defence, and his main one, for continuing the duties of the certifying surgeons was that these men were certifying not merely age but physical fitness for the work.¹²⁵ He repeatedly used this argu-

ment although strangely he was prepared to modify it, presumably on account of the expense to employers, for small workplaces. In this defence of the certifying surgeon he had the agreement of Alexander Redgrave despite the unpopularity of the system.¹²⁸

But the two inspectors saw this system of medical examination in a different light, and herein lies the third and most interesting argument for continuation of certifying surgeons. Whereas Redgrave considered that the certifying surgeon did not go into the factory nor was it his place to do so and that the certificates could equally well be given at his residence,¹²⁹ Baker saw the examinations as part of a larger whole.¹³⁰ Doubtless speaking from his own experience, he advised that, 'Once a month the certifying surgeon should be required by the mill owner, for his own sake, and for the welfare of his hands, and for the securing to himself efficient labour, to pass through all his rooms when the workers were at work, to notice them carefully, and to point out any that were suffering from the kind of labour, or dust or gases to which they were exposed. Nobody can doubt but that young hands, and even old ones, sometimes need this sort of medical supervision, after being brought perhaps from the fresh air of the country and submitted to high temperatures, lengthened confinements, and impure miasma, for weeks or months; and the profit of healthy vigorous work-people over languid ones from incipient disease or physical inability, would amply repay the extra and trivial remuneration which the certifying surgeons would require.'

From the way things have developed, surveillance by the certifying surgeon has become more selective, nowadays covering only those workers exposed to specified risks. But, one hundred years after he wrote these words, Baker would find many who would today agree with him on such widespread cover.¹³¹ He does not suggest what to do with the 'languid ones with physical inability'. That was surely the rock on which his suggestion of comprehensive statutory medical supervision would founder.

The Factory and Workshop Commission of 1876 considered the proposal that the certifying surgeon should visit every portion of the factory to examine the hygiene and sanitary conditions. They rejected¹³² it for reasons which make interesting reading at the present time: (it) 'would greatly increase expenses imposed on employers and these duties are or ought to be sufficiently performed by the inspecting staff... it would be going beyond what a Government can properly undertake, to carry on a continual medical inspection of all places of work. Such inspection might be with almost equal propriety extended to the homes of the poor'.

Baker saw the certifying surgeon as part of the whole pattern of preventive medicine. At about the time of the 1871 Royal Sanitary Commission, which led to the establishment of the country-wide public health service as we know it today, he wrote,¹³³ '... these are sanitary days. Everything social is tending to sanitary action, and happily for the public health and longevity of the people it is that the next great question of the day, after that of education is settled, promises to be the sanitary conditions of the towns and villages of the country, a rescuing of all classes from the malaric influences and impurities which have been thrust upon them, aye or no, by the progress of commerce or by the neglect of local authorities. And sanitary laws will originate a new place of the whole sanitary questions, and much of what now belongs as it were to factory visitation will necessarily be absorbed by them (*sic*). Whatever pertains to the question of public health, whether within the factory or out of it will fall under the consideration of an officer of health, and the way will be so far cleared for the advance of one branch of sanitary science. Thus it would be with unfeigned regret that one would see the sanitary principles of the Factory Act upset by any misunderstanding as to the nature of the surgeon's certificate or as to it being one of age only.'

It may be no more than coincidence that, at about the time the 1876 Factories Inquiries Commission was sitting, there appeared three medical articles on the physique of factory children. Dr. Ferguson of Bolton, in two articles published in 1875, claimed that half the children he saw as a certifying surgeon were unfit, and that as the years had passed the numbers had increased.¹³⁴ He suggested that the cause did not lie in the mills: 'They are more clean and free from dust. The only objection raised by the workpeople is that the mills are of too high a temperature. I have no personal knowledge of this,* but if it is so it will act prejudicially upon the health of the mill hands, especially feeble children.'

He attributed the 'degeneracy' of the factory population to their inadequate diet, their drunkenness, and to smoking. Baker's approach to this was twofold. He obviously felt that he could not allow one certifying surgeon to reject half the children he saw and recommended to Dr. Ferguson that all children who were 13 and physically fit should be passed,¹³⁵ and referred to his own earlier studies in 1834 from which he had concluded that the test of weighing was 'too variable to be efficient'.¹³⁶ Nevertheless, the claim that the physique of factory children was deteriorating merited further attention,

*A sad admission from a man who had been a certifying surgeon for 14 years, an alderman of the borough of Bolton and 'for a good part of that time' chairman of the sanitary committee.

for one of the original objects of factory legislation had been to protect their health. Baker therefore circulated all his certifying surgeons to seek their views. He carefully reviewed the replies, and his conclusion might appear to us a curious mixture of concern for the young compounded with a realization of the ill effects of trade diseases.¹³⁷

'For myself I can only again recommend a persistent medical supervision of all factories, in which numbers of children and young persons are employed, and where there are floating particles of dust, iron or any other material injurious to the air passages: to watch for injurious effects arising therefrom, and to arrest them on the instant. For far easier and better it would be to exchange employments temporarily, than to see a degeneration of physique going on, which cannot fail in time to prove disastrous to all concerned.'

A more elegant study than Ferguson's was reported by Charles Roberts, F.R.C.S., who in a full and carefully worked out paper presented observations on height, chest girth, and weight in large numbers of children.¹³⁸ He claimed that they would not only 'assist the surgeon in his duty, but protect the children and their parents from inexperienced, careless, or crotchety officials'. In fact it was another attempt to solve the old problem of uniformity among certifying surgeons which had troubled Horner, Rickards, and the young Mr. Baker more than 40 years previously.

Local Government Board

In 1872, about the time that the Medical Department of the Privy Council was absorbed into the Local Government Board, the weavers of Todmorden addressed a memorial to the Privy Council, complaining that excessive dustiness together with the high humidity caused shortness of breath, loss of appetite, bronchitis, and consumption, and that it accelerated, if it did not actually cause, lung disease. The Russian War of 1854 had led to a shortage of cotton, and the situation was made worse a few years later by the cotton famine consequent on the American Civil War. As cloth was sold by weight, some weaving firms began to use china clay, with various additions, for sizing the warps. This 'heavy sizing', it was alleged, was added to the extent of 40, 60 or even 100%.

Dr. George Buchanan, who had been a member of Sir John Simon's team at the Privy Council, was sent by the Local Government Board to investigate the problem.¹³⁹ He studied the environment, including an analysis of the dust, and then proceeded to examine mortality statistics, to collect local medical opinion, and to examine certain weavers. He con-

cluded that there was a slow but certain injury to health, and compared the conditions with grinders' asthma, miners' asthma, potters' asthma, and 'the diseases that have long been known to prevail among cotton workers themselves'.

The following year, in response to the mounting pressure for a nine-hour day for textile workers, Dr. Bridges and Mr. Holmes of the Local Government Board were instructed to investigate the hours and ages of employment in textile factories.¹⁴⁰ Here was a problem that fell clearly within the purpose and scope of factory legislation, yet the investigation of it was put into the hands of another government department. It was as though all matters concerning health, whether inside or outside the factory, should be the concern of the Local Government Board. It is interesting that these medical observers, from outside the scheme of factory inspection, repeated with approval Baker's suggestion, which has already been quoted, that the certifying surgeon should go through the whole factory once a month.¹⁴¹ Certainly this procedure would not have cured the situation but it might have helped to define the problem and perhaps have drawn attention to it.

Why did the investigation and medical supervision of dangerous trades not become a function of the factory department when there was a medical man at the head, although they were taken up some years after his retirement? Was it that he failed to appreciate the role of the factory department in this matter? Certainly by himself the parish surgeon from Leeds had not the medical standing of such men as John Simon, Hedlam Greenhow or George Buchanan. But Baker had the support of his friend, Dr. Thomas Arlidge, a physician to the North Staffordshire Infirmary, who had a great interest in industrial disease and who was the first president of the Association of Certifying Medical Officers. Certainly, in Baker's time, this group failed to realize the new possibilities open to them, and instead they used their energies to defend their long-established duties in examining children for fitness to work. And Robert Baker, their champion, by now in his seventies, had lost the vision of his youth and failed to grasp the new opportunities. That he realized the problem is very clear from the following extract from one of his reports in 1871:¹⁴²

'I remember asking, since 1864, to be permitted two liberties with respect to dusts, which were refused, *viz.*, first to employ and pay for medical skill in order to determine if a particular dust was injurious; for in the case of an inspector not having had a medical education, such a question preliminary to any interference by him with a machine, seemed absolutely necessary; and secondly, for power to call to his aid the opinion of a competent

machinist, as to the best mode of applying other mechanical means supposing a fan to be unnecessary or too expensive. As, however, these requests were negatived, I have not till lately felt myself at liberty to suggest any other.'

He was not decided on who should be the medical officer to give this advice. By 1872, with the prospect of local officers of health covering every region, Baker appeared to see them as the persons able to give specialist advice to his inspectors.¹⁴³ 'Supposing a case of dust. I go into a works and see the man covered, say, with the dust of the pearl oyster in making buttons, or the dust of hollow ware which is caused by turning ware, or the dust of china scourers, all of them very serious and fatal after a little while, and I say to the master of the premises, "This dust is very fatal to your workpeople, and I require you to take some steps to prevent it in future from having this effect." He first of all would say to me, "How do you know that it is fatal?" I reply, "I know it of my own knowledge." His answer is, "We say that it is not." I should, therefore, be glad to bring in the officer of health to confirm or otherwise for the satisfaction of the occupier my opinion that it was a dust which was prejudicial and how the evil ought to be removed.'

It is interesting to see Baker making use of the 'officer of health' in this way, when the certifying surgeons were already going into the factories. On the other hand, a few years later he cast the certifying surgeons in this role:¹⁴⁴ 'I have here an application which I made to the Home Office, in which I applied to be allowed to call in a medical man with respect to dust, and then an engineer to say what should be the best and readiest mode of getting rid of those dusts; but it was refused me. I did not choose to place myself in the capacity of a medical man at that moment, but I had seen enough of the flocculi of iron to know that they were producing very great mischief, and I wanted some other medical man, the certifying surgeon of the district, for example, to be called in to give me his assistance upon which I might form a recommendation to the Government; and the answer of the Treasury was that they would not do it, that it would be making the Government liable for all kinds of engineering difficulties and engineering expenses.'

With regard to measures for general ventilation and overcrowding in factories and workshops, Robert Baker, in evidence before the Royal Sanitary Commission of 1871, envisaged the future medical officer of health playing an active part. He pointed out that the factory inspectors were powerless to enforce measures for general ventilation¹⁴⁵ and recommended that the law should be made compulsory with regard to overcrowding.¹⁴⁶ He sug-

gested that a subordinate of the medical officer of health should measure up a workshop and license it for a certain number of persons.¹⁴⁷ As many of the smaller premises were old and dilapidated, he proposed to the Commission that factory inspectors should be able to call in the local medical officer:¹⁴⁸ 'I think the officers of health backing me up in the idea that the place wanted ventilation, would call upon the local authorities to know what they would do: whether the place should be pulled down or whether it would be necessary to take other steps. It would be a very difficult question indeed, but I think it should be remedied.'

He pointed out that it was often very difficult to improve the ventilation in old buildings, *e.g.*, where old attics had been added from the next-door house in order to extend the 'factory'. In these circumstances the local knowledge of the officers of health about proposed demolitions and rebuildings would be of great advantage.

Robert Baker saw the factory inspectorate filling a role of education and enforcement. The investigation of health hazards he clearly regarded as the duty of specialists outside the inspectorate. It is understandable that in the climate of that time he saw the emerging 'officers of health' as the guardians of health inside and outside the factory. But the social reformer and zealous inspector did not have the vision of organization to see where the certifying surgeons should fit in. That he should have defended their original duties is debatable. If only he had clearly seen, as we can from this distance in time, that with their opportunities for intimate knowledge of the factories the certifying surgeons should be able to advise on the environmental conditions and their effects on the operatives and that for this they needed training, in the same way as he had recommended¹⁴⁹ for the officers of health!

Perhaps it is this confusion in Baker's later years that is the greatest disappointment. He had been, in his early days, closely associated with sanitary reform before he moved into industry and saw the problems there. Many of his ideas in industrial medicine were well in advance of his time, and he failed to get them implemented. Why was this? Was it because they were swept aside by the great tide of general sanitary reform of the 1870's? Was it because he failed, as the leader of industrial medicine at that time, to integrate the certifying surgeons with the new sanitary measures? Why did he fail? Was it some personal failing in the Home Office? On the evidence available we are reduced to speculation. It may be argued that although Baker was aware of the problems of the day, he was too preoccupied with the problems of the past, the control of infectious disease and the protection of children.¹⁵⁰ In this he was maintaining

April 22 1868

Gentlemen

I waited, this morning, on Lord Shaftesbury, and presented to him the Memorial from a large body of the Operatives of the Counties of Chester, Lancashire, & York, requesting some work

of Royal Favour
to be bestowed on
Mr Baker, the active,
able, & meritorious
Inspector of factories
He received me
with much courtesy,
& promised to give
the Memorial, his
"most favourable
consideration" —

J. W. L. S.
Thos. L. S.
Thos. L. S.
Thos. L. S.

FIG. 6.—Letter from Lord Shaftesbury concerning, 'Mr. Baker, the active, able and meritorious Inspector of Factories'.

the *status quo* of the certifying surgeons rather than adapting their duties to the newer needs. But until more is known of the thoughts and moves that took place behind the official reports and recommendations, we shall not know why industrial medicine was still-born in the age of sanitary reform.

Recognition and Retirement

Baker's work was recognized and appreciated by those he sought to help. At the Trades Union Congress in 1869 a speaker commented on 'the strictness of Mr. Baker in carrying out the Factory Acts', and said 'Mr. Redgrave's laxity had caused the working classes in his district to care very little about the Factory Acts'.¹⁵¹ In April 1868 the operatives of several northern counties petitioned the Prime Minister for Royal favour on Robert Baker. This is described in a letter from Lord Shaftesbury to two acquaintances (Fig. 6). The effort failed, but some years later Baker wrote to Matthew Balme* thanking him and offering 'a silver inkstand or a bit else in silver within the compass of £10'.¹⁵²

In 1878, Robert Baker, now 78, retired and was appointed C.B. His colleague, Alexander Redgrave, became the first Chief Inspector of Factories. From the tone of Baker's later factory inspector's reports it may be surmised that he was not always in accord with Redgrave or those above him. The Factory and Workshops Commissioners in their report of 1876 remarked somewhat dryly:¹⁵³ 'Even the old staff of four inspectors, holding their periodical board meetings, was probably a better arrangement than the present, under which, of two inspectors, one resides in London, and the other in the Midland district; and all contact between them, as is shown by their half yearly reports, is limited to the bare necessities of their official duty'.

The last word may be left with the obituary in the

*Matthew Balme, the son of a woolstapler, was born near Bradford in 1813. He worked as a teacher, in local government, and then as a registrar of births and deaths. An early member of the Bradford 'Short-Time Committee' (later a Ten-hour Committee) he became the secretary in 1838 and a few years later was made secretary to the Yorkshire Central Committee. In 1868 he joined with Lord Shaftesbury and Phillip Grant of Manchester to petition Disraeli on Baker's behalf. Balme's later years were spent in maintaining contact with old friends in the factory movement. He died in 1884 and is today almost forgotten.¹⁵⁴

British Medical Journal.¹⁵⁴ 'He was much beloved by the certifying surgeons under the Factories Act; and it is to be lamented that his efforts to improve the arrangements for the physical protection of children under the Factories Act were not always officially regarded with favour'.

Personal Life

An account of Robert Baker's work in the factory department would not be complete without mention of some other aspects of his life. His work as a member of the Leeds Town Council was mentioned in Part I. On his promotion to inspector in 1858 he moved to Milverton, just outside Leamington Spa. He soon became a member of the Milverton Board of Health,¹⁵⁵ whose meetings he regularly attended, being appointed to numerous *ad hoc* subcommittees dealing with matters ranging from 'the expediency of the Board erecting finger posts for the instruction of strangers'¹⁵⁶ to negotiating sewage and water supply.¹⁵⁷

In 1863 he was appointed to the Management Committee of the Warneford General Hospital, Leamington,¹⁵⁸ and the next year he became Vice-chairman of the committee.¹⁵⁹ He became involved in 1870 in a lively controversy over the resignation of one of the physicians. At a meeting of the Governors in May of that year, Robert Baker defended the action of the management committee on the grounds that they had been procedurally correct, even though, he claimed, he was with the general sentiment of the meeting which strongly disapproved of the committee's action.¹⁶⁰

Within a short time of that meeting he was 'attacked by severe congestion of both lungs, and subsequently confined to bed and the house for upwards of three months'.¹⁶¹ By now, aged 68 and with a job covering half the British Isles, he appears to have taken this illness as a warning to reduce his activities, for soon after he resigned from the Milverton Board of Health and from the Committee of the Warneford Hospital.¹⁶² Despite the very recent controversy the committee expressed far more than the conventional vote of thanks:¹⁶³ 'The Committee cannot conclude their report without alluding to the very great services rendered to this Institution by their late Comptroller, R. Baker, Esq., and expressing their sincere regret at the serious illness which has deprived them of his further assistance. To his indefatigable zeal and energy the Hospital is indebted for a number of salutary improvements; for much of its present and extended area, and especially for its Children's Ward, and for the more convenient arrangement of its several parts'.

Robert Baker died in Leamington on February 6,

1880, two years after his retirement.¹⁶⁴ His wife moved to a smaller house in the town where she resided until her death in 1903.¹⁶⁵ She is still remembered by members of the family as a somewhat terrifying figure of their childhood, a link with the young industrial medical officer of 130 years ago, the first doctor in the factory department.

I wish to thank Dr. W. H. Chaloner, of the Department of History, University of Manchester for his continued interest and valuable suggestions. Mr. M. E. Rose, of the same department, drew my attention to Baker's work as a Migration Officer. Professor C. F. Brockington, of the Department of Social and Preventive Medicine, University of Manchester has read the text and suggested improvements. Dr. R. Murray, of the Trades Union Congress, told me of the reference in the T.U.C. Minutes. To Mr. Tallamy, Librarian at Royal Leamington Spa, I am very indebted for his ready help in directing my searches among local records. Finally, the descendants of Robert Baker have kindly spared no effort to help and have given encouraging support throughout this interesting investigation. *

The documents, Figures 1 and 2, were kindly loaned by members of Robert Baker's family. The picture for Figure 3 was loaned by Dr. T. A. Lloyd Davies, Senior Medical Inspector of Factories, and is reproduced with his consent. The illustrations from Factory Inspectors' Reports, which form Figures 4 and 5, are reproduced with permission from Her Majesty's Stationery Office. The original letter, which is copied in Figure 6, is in the Balme Collection of Bradford City Library and is reproduced by kind permission of the City Librarian.

The photography of Figures 2 and 3 was done by the Department of Medical Illustration, Manchester Royal Infirmary; Figures 1 and 4 were photographed by the Photographic Section of the Arts Library, University of Manchester, and Figure 5 by Manchester Central Library.

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³This is recorded in Baker's obituary published in the *British Medical Journal* (1880), i, 383. As the pay-rolls of the Hull General Infirmary for that period have not been preserved, there are no local records of his attendances.

⁴The Society of Apothecaries records are deposited in the Guildhall Library, London. In MS 8241/2 at May 1, 1823 is the following entry:

Baptized August 19, 1801. All Saints, York. Mr. Flower (?) Curate. Mr. Robert Baker, of full Age, Candidate for a Certificate to practise as an Apothecary in (blank). An apprentice to Mr. William Pearson of Sculcoates, York, Apothecary, for five years. Indenture dated March 23, 1818.

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³¹As (28) at p. 130.

³²Factory Inspector's Reports (Saunders) for period ending October 1, 1838, p. 12.

³³Factory Inspector's Reports (Baker) for period ending October 31, 1868, p. 195.

³⁴Parliamentary Papers, 1837, L, 205. See also Hutchins & Harrison (27, *supra*) at p. 46.

³⁵Factory Inspector's Reports (Baker) for period ending April 30, 1869, p. 101.

³⁶As (34) at p. 209.

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³⁸As (28) at pp. 124 and 127.

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